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09/605,085	06/26/2000	Jonathan H. Gross	IRI05342	3378

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EXAMINER	
D AGOSTA, STEPHEN M	

ART UNIT	PAPER NUMBER
2683	

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/605,085	GROSS ET AL.	
	Examiner	Art Unit	
	Stephen M. D'Agosta	2683	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-19,21 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 4, 6-7, 9-19 and 21-22* is/are rejected.

7)☒ Claim(s) *3 and 5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 6-29-04 have been fully considered but they are not persuasive:

1. The examiner notes that claim 7 was objected to in the previous action but the applicant has chosen not to amend the independent claims with said material.

2. The examiner notes the applicant's request for another non-final, unfortunately the examiner disagrees with the applicant and a Final Action is attached. The examiner disagrees for the following reasons:

a. The prior art of record, when combined per the examiner's action, fully reads on the art and provides motivation to combine.

b. The examiner answered, to the best of his ability and in the most efficient manner, all the applicant's arguments. Disagreeing with the examiner is not grounds for the applicant to request another non-final office action.

c. The examiner believes that one skilled would be able to read the examiner's prior office action(s) and, using said art and knowledge of the technical field of endeavor, fully understand that the action(s) read on the claims.

d. Amending of the claims with objected to material may provide a more favorable outcome.

To fully address this point, Martin teaches various points in the claims but is silent on others. Barnett and Ross were added to remedy the situation.

i. Martin (abstract, figures 1 , 2, 4 and 8a) and Ross (figure 1 and abstract) both disclose obtaining location/heading/position of a "mobile user" (eg. person, car, aircraft)
while Ross teaches directing respective beams transmitted from the airplane based on airplane flight pattern data (figure 1 and abstract).

Hence, the examiner combines Martin with Ross to obtain directing antenna beams from the airplane for communication purposes based on the location, heading and position of a mobile user. Aerial/space-based BTS's are known in the art and need to adjust their antenna's in order to provide "cell" coverage to ground-based users. The examiner interprets land/space-based BTS's as being equivalent and one skilled would provide both to a user as they roam (eg. handoff from terrestrial BTS to aerial/space-based BTS) along with the known required operational support (eg. plane's operational parameters, user's operational parameters and how to provide communications to said user as the plane/satellite flies).

ii. Barnettt teaches calculating a list of viable handoff terrestrial cell site candidates (abstract) based on maintaining of a fixed beam pattern, the determining of a location
and heading of the user/airplane, their determination of locations of respective beams transmitted from the user/airplane based on user/airplane movement/flight pattern and
the determining of locations of respective cell sites (the examiner notes that while Barnettt is focused on a mobile user and a BTS, it is broadly interpreted as reading on
the claim simply by replacing the "mobile user" with an "aircraft" as taught by the art above).

Hence a Barnett teaches handing off from one cell site to other candidates – the examiner interprets the terrestrial BTS as being equivalent to an aerial BTS since handoff operations will be required at some point as the user roams.

iii. Therefore, the examiner states that it would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that the system uses location of plane and beams and cell sites in footprint/vicinity to calculate handoff list, to provide means for the system to support plane-based handoffs as the plane roams. This provides a remedy to the portions that Martin is silent on via the combination of art as outlined by the examiner.

3. Regarding claims 1 and 13, the applicant argues that the prior art does not teach "calculating a list of viable cell site candidates.....". The examiner disagrees since the prior art teaches 1) mobile cellular communications which utilize determination of candidate cell sites for handoff and 2) aerial BTS support which operates in much the same manner as a terrestrial BTS. Hence, an aerial BTS would need to further determine the location and direction of the plane/satellite as it moves in relation to the mobile user (which reads on the claim).

4. Regarding claim 4, the applicant argues the "official notice" aspect regarding no prior art cited regarding "use of probability". The examiner disagrees and has added Aalto is response to this argument.

5. Regarding claim 14, the examiner broadly interprets the control of the antenna to include the lobe, beam footprint, etc.. The control of the antenna is made such that it optimizes the RF link.

6. After further review, the examiner now objects to claim 3.

7. The modified office action is attached below.

Response to Arguments

Applicant's arguments with respect to claims 1-7, 9-19 and 21-22 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 4-6, 9-14 and 16-19 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. US 6,061,562 and further in view of and Ross US 6,275,187 and Barnettt et al. US 5,509,051.

As per **claim 1**, Martin teaches a method of maintaining a terrestrial cell site handoff list for airborne cellular system (C2, L37-50 teaches storing in memory an association between beams and serviced cells to compensate for beam handoff) comprising:

Martin teaches maintaining a fixed beam pattern of beams transmitted from an airplane relative to terrestrial cellular system users each of the one or more beams supporting cellular communications for terrestrial cellular system users, all of the one or more beams covering a footprint on the ground (figure 1, #16, #40 and #42 and #46) and determining locations of respective cell sites within a vicinity of footprints of the respective beams transmitted from the airplane (figure 1 shows that airplane must be aware of cell sites #42 it is communicating with within it's footprints).

But is silent on

Determining a location and heading of the plane

Determining location of each of the one or more beams transmitted from the airplane based on airplane flight pattern data

Determining locations of respective cell sites within a vicinity of the footprints of the one or more beams transmitted from the airplane

Calculating a list of viable handoff terrestrial cell site candidates for handoffs between one or more beams and terrestrical cell sites based on maintaining a fixed beam patter, the location and heading of the airplane, ther locations of respective beams transmitted from the airplane based on airplane flight pattern and the locations of respective cell sites.

Martin (abstract, figures 1, 2, 4 and 8a) and **Ross** (figure 1 and abstract) both disclose obtaining location/heading/position of a "mobile user" (eg. person, car, aircraft) while **Ross** teaches directing respective beams transmitted from the airplane based on airplane flight pattern data (figure 1 and abstract).

Barnettt teaches calculating a list of viable handoff terrestrial cell site candidates (abstract) based on maintaining of a fixed beam pattern, the determining of a location and heading of the user/airplane, their determination of locations of respective beams transmitted from the user/airplane based on user/airplane movement/flight pattern and the determining of locations of respective cell sites (the examiner notes that while Barnettt is focused on a mobile user and a BTS, it is broadly interpreted as reading on the claim simply by replacing the "mobile user" with an "aircraft" as taught by the art above).

With further respect to claim 13, Martin **is silent on a** database and processor. Barnettt teaches a measurement list that is determined which requires a processor and storage.

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that the system uses location of plane and beams and cell sites in footprint/vicinity to calculate handoff list, to provide means for the system to support plane-based handoffs as the plane roams.

**The examiner notes that Ray and ARCSS Slides, previously cited in prior rejections, disclose technical designs that read considerably on the applicant's independent claims as well.*

As per **claim 2**, Martin teaches claim 1 and teaches determination of location and heading comprises a receiving flight pattern location of the airplane via telemetry link (C5, L30-42 and C8, L23-39 and C8, L57-62). The examiner notes that Ross above teaches determination of aircraft position (abstract).

As per **claims 5 ~~and 20~~**, Martin teaches claim 4/18 and using protocol dependence for cell site candidate list (C2, L22-36 teaches connectivity to various technologies that each use different protocols, eg. PSTN, Internet, cable, video, etc.).

As per **claim 6**, Martin teaches claim 1 wherein the list of handoff sites for handoffs of a terrestrial mobile user between one or more beams and terrestrial cell sites is performed for each respective beams transmitted from airplane (figure 1 shows multiple beams from the airborne platform, #40 which serve cellular users and would inherently require handoff information to ensure that a roaming user who roams from one of the served cells, #42 to another cell is supported via handoff as is well known in the art).

As per **claims ~~7 and~~ 18**, Martin teaches claim 13 **but is silent on** comprising dividing up list of handoff sites into multiple candidate groups according to geographic locations within of the one or more beams and cycling through multiple candidate groups to further reduce the list of handoff candidates based on multiple groups.

Barnett teaches prioritization of neighboring cells which can be grouped as required based upon user needs (ie. signal strength, location, heading, etc.).

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that the handoff list is divided into groups based on location within each by and cycling through the groups to reduce list of candidates, to correlate cell locations and beam(s) supporting the cell(s) for optimal handoff support.

As per **claim 9**, Martin teaches claim 1 comprising updating list of handoff sites as a function of time as the airplane pattern changes (figure 1 shows the airborne communication system #12 as supporting certain cell sites #42 and would inherently require the system operators to fully understand where the plane is and how it impacts service to various areas/cells – hence Martin inherently must update the list of handoff sites as a function of time as the airplane pattern changes otherwise mobile users would have service impacted as the plane travels in/out of communications range).

Further to this point, as stated in claim 1, **Martin** (abstract, figures 1, 2, 4 and 8a) and **Ross** (figure 1 and abstract) both disclose obtaining location/heading/position of a "mobile user" (eg. person, car, aircraft) while **Ross** teaches directing respective beams transmitted from the airplane based on airplane flight pattern data (figure 1 and abstract).

As per **claim 10**, Martin teaches claim 1 wherein calculating a list of viable cell sites is performed to compensate for flight pattern changes caused by adverse weather conditions (Martin teaches interference by weather, buildings, trees, vehicles and terrain C4, L49-60 and C12, L30-64).

As per **claim 11**, Martin teaches claim 1 comprising calculating viable airplane beams (as shown in figure 1 #42 cell sites) **but is silent on** beams for receiving handoffs from cell sites and creating an airplane beam handoff list based on the calculating of viable airplane beams.

Martin does teach (figure 1 #40 and 42) that as the plane moves, handoffs would occur based on the beam the RF link is being supported by.

Barnett teaches cell site handoff prioritization (abstract).

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that beam handoff list is determined, to provide means for controlling beams for handing off RF links for optimal communications.

As per **claim 12**, Martin teaches claim 1 comprising dividing the list of handoff sites into time sensitive candidates and non-time sensitive handoff candidates (Martin discloses supporting data such as voice, cable, video etc. (C2, L22-35) and these are time sensitive whereby an ISP (C2, L34) may be supporting data such as email is (less) time sensitive. One skilled in the art would provide for identifying time sensitive and non-time sensitive data for better quality of service.

As per **claim 14**, Martin teaches claim 13 **but is silent on** the flight pattern information comprises airplane location, heading and beam footprint information.

Martin (abstract, figures 1, 2, 4 and 8a) does teach cell site footprint(s), figure 1, #40 and obtaining location/heading/position of a "mobile user" (eg. person, car, aircraft). Further to this point is **Ross** who teach directing an airplane's antenna array/footprint.

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that flight pattern includes location, heading and beam footprint, to provide information between mobile and fixed ground station so they understand each other's position, heading and coverage to support all RF links optimally.

As per **claim 16**, Martin teaches claim 13 **but is silent on** wherein the receiver, database and processor are in the airplane and communicate with ground-based control station via telemetry link.

The examiner puts forth that "telemetry" is a well known concept whereby data is received from an aircraft/rocket/etc. by a ground system operator for command/control purposes. ARCSS teaches "PIC-ARCS Support" (slide #9) with "uplink commands" and "downlink status data" which requires a receiver, database and processor are in the airplane and communicate with ground-based control station via telemetry link.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Martin, such that receiver, database and

processor are in the airplane and communicate with ground-based control station via telemetry link, to provide means for the ground crew can observe the airborne system for command and control purposes.

As per **claim 17**, Martin teaches claim 13 **but is silent on** wherein the handoff candidate list includes cell sites within a single communication beam.

While Martin does teach a system with multiple beam uplink/downlinks (figure 1, #40) for communication/handoff, **Barnettt** teaches a handoff list (abstract).

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that handoff list includes sites within a single beam, to provide means for understanding how each user is connected/supported and if/when a handoff will be required (between beams, BTS's, etc.).

As per **claim 19**, Martin teaches claim 13 **but is silent on** processor calculates handoff list for terrestrial sites to beams.

Martin does teach a system with multiple beam uplink/downlinks (figure 1, #40) for communication/handoff while **Barnettt** teaches a neighbor handoff list. One skilled in the art would use the handoff list and correlate it to uplink/downlink beams for optimal operation.

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that the processor calculates handoffs, to provide means for a computer to perform all operations for automatic handoff.

Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin/Barnett/Ross and further in view of Aalto US 6,041,235.

As per **claim 4**, Martin teaches claim 1 **but is silent on** ranking each handoff site based on probability data found during calculating list of candidate sites.

Barnett teaches prioritization list of neighboring cells (title and abstract).

Aalto teaches:

- It is advantageous, however, to place the candidate cells in an order in accordance with certain priority levels by using other criteria. When priority levels are determined the location of the candidate cell or whether the base station of the candidate cell is controlled by the same base station controller (or MSC) as the serving cell, or by some other base station controller BSC (or MSC) may be taken into account. The load in the cells may also be taken into account when priority levels are determined so that a high load in a cell diminishes the priority of the cell. The serving cell typically has the lowest priority, i.e., intracell handover is performed only if none of the candidate cells is sufficient (as to signal strength conditions) for handover. The main principle in the use of priority levels is that cells with higher priority are preferred to those with lower priority, i.e., a cell has a higher has rank than another cell if it has a higher priority level, even if its signal strength values are lower. When this principle is followed, the measured signal levels play a part in the selection of the target cell from the candidate cells only if two candidate cells have the same priority level (C5, L5-23)

- Interference levels estimated in the selection procedure of the target cell for handover are used so that a high potential interference level reduces the probability of the candidate cell to be selected as the target cell so that the possibility of handover is minimized or totally prevented to a cell the signal quality of which would probably be poor. A low interference level or total absence of interference in a candidate cell maintains the possibility of the candidate cell for selection unchanged, or increases it so that the handover of the mobile station will be directed to the cell with the best signal quality (C7, L52-61).

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that ranking is used, to provide means for prioritizing which cell site(s) are viable as handoff candidates.

Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin/Barnett/Ross and further in view of Ayyagari et al. EP0837567

As per **claim 15**, Martin teaches claim 13 **but is silent on** wherein the database and processor are implemented in ground-based BTS.

Barnett teaches ground-based communication for mobile users (abstract implies ground-based communications) and **Ayyagari** teaches a ground-based control system for airborne broadband communication network (abstract).

It would have been obvious to one skilled in the art at the time of the invention to modify Martin, such that the database and processor are ground based, to reduce hardware required in the airplane/air (which reduces weight).

Claims 21-22 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin/Barnett/Ross and further in view of Brody et al. US 4,670,899.

As per **claim 21,** Martin teaches claim 1 **but is silent on** wherein calculating a list of viable handoff terrestrial cell site candidates further comprises using the relative density of each of the viable handoff cell site candidates to rank the list.

Brody teaches load balancing of cells in a cellular mobile radio telephone system is performed by periodically determining the channel utilization of each cell, computing a representative voice channel occupancy level, and attempting to hand-off calls from cells with higher voice channels occupancy levels to adjacent cells with lower voice channel occupancy levels. Voice channel occupancy levels of cells are measured and compared with threshold values, and the results of the comparisons are used to direct cells to enter predetermined states. Cells are selected as hand-off candidates for hand-offs initiated to more evenly distribute loading throughout the cellular system in accordance with cell state (i.e., voice channel occupancy level) and measured signal strength at the cells of the calls attempted to be handed off (abstract).

The examiner notes that relative density is interpreted as how densely the communication channels are being used.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Martin, such that calculating a list of viable handoff terrestrial cell site candidates further comprises using the relative density of each of the viable handoff cell site candidates to rank the list, to provide means for not handing a mobile user off to a highly loaded cell which may cause loss of service.

As per **claim 22,** Martin teaches claim 13 **but is silent on** wherein the handoff list is ranked by the relative density of each handoff candidate on the handoff candidate list.

Brody teaches load balancing of cells in a cellular mobile radio telephone system is performed by periodically determining the channel utilization of each

cell, computing a representative voice channel occupancy level, and attempting to hand-off calls from cells with higher voice channels occupancy levels to adjacent cells with lower voice channel occupancy levels. Voice channel occupancy levels of cells are measured and compared with threshold values, and the results of the comparisons are used to direct cells to enter predetermined states. Cells are selected as hand-off candidates for hand-offs initiated to more evenly distribute loading throughout the cellular system in accordance with cell state (i.e., voice channel occupancy level) and measured signal strength at the cells of the calls attempted to be handed off (abstract).

The examiner notes that relative density is interpreted as how densely the communication channels are being used.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Martin, such that calculating a list of viable handoff terrestrial cell site candidates further comprises using the relative density of each of the viable handoff cell site candidates to rank the list, to provide means for not handing a mobile user off to a highly loaded cell which may cause loss of service.

Allowable Subject Matter

Claims 3 and 7 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

This claim now recites a highly specific design which, in the examiner's opinion, would be allowable over prior art.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. D'Agosta whose telephone number is 703-306-5426. The examiner can normally be reached on M-F, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Trost can be reached on 703-308-5318. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephen D'Agosta
8-12-04

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